TRM 1007

Surfing the MISP

A quick guide to the Motion Imagery Standards Profile

Current to MISP Version 6.5

The MISB

From 1996-2000, the DoD/IC Video Working Group (VWG) developed motion imagery standards and the principal document was called the Video Imagery Standards Profile and in 2000 became the Motion Imagery Standards Board (MISB) under the NGA Innovision Directorate, effectively establishing an official standards body responsible for reviewing and recommending standards for motion imagery, associated metadata, audio and other related systems for use within the Department of Defense, Intelligence Community, and United States Imagery and Geospatial System (DoD/IC/USIGS). The MISB is the primary agent for the Functional Management role of NGA with respect to motion imagery.

Motion Imagery is recognized by the Intelligence and Defense communities as a vital part of our current and future intelligence picture. As our ability to collect motion imagery and achieve persistent surveillance continues to grow, ensuring interoperability of motion imagery formats with other types of sensor outputs, and making that critical intelligence available to those who need to know becomes increasingly important.

Standards greatly increase the value of information. By providing an underlying "common language" for the sharing of information, standards foster breadth in knowledge and depth in intelligence. Nowhere are standards more crucial in realizing this added value than within the acquisition, processing, exploitation, and dissemination workflow processes for motion imagery rich-media assets.

Establishing standards for motion imagery encoding, metadata schemas and dissemination protocols in conjunction with compliance enforcement and testing helps prevent the proliferation of proprietary, stovepipe systems that are not interoperable. The MISB's mission is to unify the motion imagery workflow, effectively maximizing the value of MI assets for all stakeholders. Architecting the PED workflow within a standards-based foundation and guiding the development, acquisition, and implementation of tools, technologies and processes will position our Community to create solutions that have far greater value for the warfighter.

Working Groups

Advanced Compression Working Group (ACWG)

Serves to identify and recommend commercially standardized motion imagery compression technologies for use in the DoD and the Intelligence Community.

Advanced Sensors Working Group (ASWG)

Serves to identify and recommend commercially standardized motion imagery compression technologies for use in the DoD and the Intelligence Community.

Interoperability & Conformance Working Group (ICWG)

Serves to identify and recommend technical guidance to ensure interoperability of motion imagery systems and products across the DoD and Intelligence Community and oversee the formal motion imagery conformance testing process.

Metadata Working Group (MWG)

Serves to identify and recommend metadata content and representation of motion imagery metadata for use in the DoD and Intelligence Community that enables the access and increased accuracy / precision for exploitation.

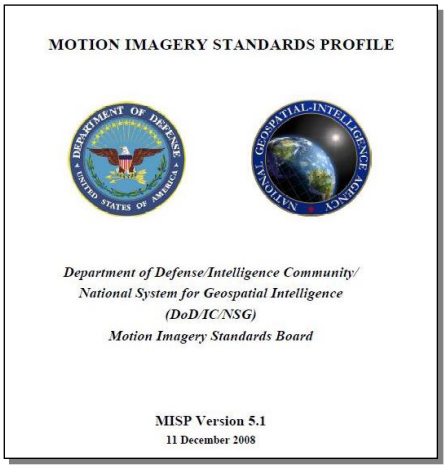
Transport Working Group (TWG): Serves to identify and recommend protocols, formats, and timing information necessary to distribute motion imagery data over a variety of networks in use within the DoD and Intelligence Community.

Motion Imagery Tradecraft Working Group (MITWG)

A collaborative government/industry working group focused on the challenges of collection, storing, retrieving, processing and analyzing large volumes of motion imagery for the development of intelligence and for the support of military operations.

Interpretability, Quality, and Metrics Working Group (IQMWG)

Serves to identify and recommend techniques to quantify and qualify the various impacts to interpretability and quality of motion imagery data as it is generated, disseminated, and exploited within the DoD and Intelligence Community.

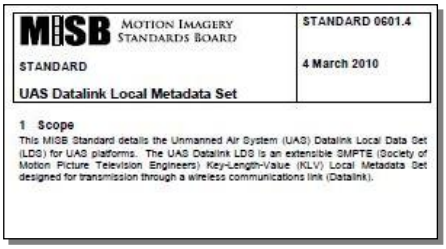

MOTION IMAGERY STANDARDS PROFILE

Department of Defense/Intelligence Community/ National System for Geospatial Intelligence (DoD/IC/NSG) Motion Imagery Standards Board

MISP Version 5.1
11 December 2008

MISP: The Motion Imagery Standards Profile (MISP) is applicable to all DoD/IC/NSG motion imagery systems that are subject to the DoD Joint Technical Architecture and the NSG Technical Architecture. All new motion imagery systems are required to be compliant with provisions of the MISP as soon as practical.

MISP compliance is based upon compliance to a specified approved version of the MISP (e.g. MISP Version (V) 5.1, MISP V5.0, etc.). The motion imagery system supplier specifies the MISP version for which it is seeking compliance along with three qualifications: the MISM-Level or IRSM-Level for compression, any metadata RP/EG/STDs, the file format for transport or storage, and any MISB timing specifications.


MISB MOTION IMAGERY STANDARDS BOARD

STANDARD 0601.4

STANDARD

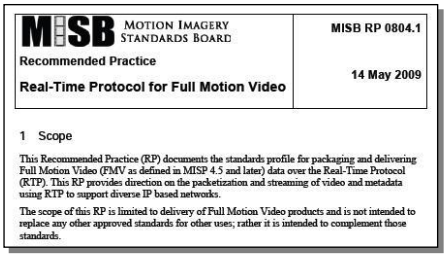
4 March 2010

UAS Datalink Local Metadata Set

1 Scope

This MISB Standard details the Unmanned Air System (UAS) Datalink Local Data Set (LDS) for UAS platforms. The UAS Datalink LDS is an extensible SMPTE (Society of Motion Picture Television Engineers) Key-Length-Value (KLV) Local Metadata Set designed for transmission through a wireless communications link (Datalink).

STANDARD: Where the MISP term STANDARD is used, the MISP item (chosen by specific MISB adoption, and approved by the NCGIS), mandates binding technical implementation policy, and as such, should be identified in Government procurement actions as a mandatory compliance item in order for vendor offerings to be accepted by the Government. Standards, as represented in this MISP are not considered voluntary for DoD/IC/NSG users and systems. They are mandatory.


MISB MOTION IMAGERY STANDARDS BOARD

MISB RP 0804.1

Recommended Practice

14 May 2009

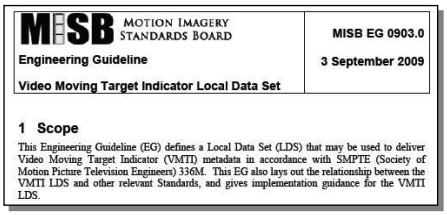
Real-Time Protocol for Full Motion Video

1 Scope

This Recommended Practice (RP) documents the standards profile for packaging and delivering Full Motion Video (FMV as defined in MISP 4.5 and later) data over the Real-Time Protocol (RTP). This RP provides direction on the packetization and streaming of video and metadata using RTP to support diverse IP based networks.

The scope of this RP is limited to delivery of Full Motion Video products and is not intended to replace any other approved standards for other uses; rather it is intended to complement those standards.

RECOMMENDED PRACTICE: Documents a recommended implementation or practice that further clarifies the implementation of a STANDARD or PROFILE in order to insure interoperability across DoD/IC/NSG systems. Recommended Practices chosen by specific MISB adoption should be considered to be a technical implementation policy, and as such, may be identified in Government procurement actions as a mandatory compliance item in order for vendor offerings to be accepted by the Government.


MISB MOTION IMAGERY STANDARDS BOARD

MISB EG 0903.0

Engineering Guideline

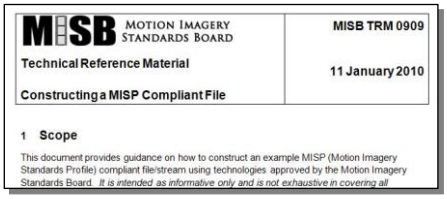
3 September 2009

Video Moving Target Indicator Local Data Set

1 Scope

This Engineering Guideline (EG) defines a Local Data Set (LDS) that may be used to deliver Video Moving Target Indicator (VMTI) metadata in accordance with SMPTE (Society of Motion Picture Television Engineers) 336M. This EG also lays out the relationship between the VMTI LDS and other relevant Standards, and gives implementation guidance for the VMTI LDS.

ENGINEERING GUIDELINE: Represents good engineering principals, and therefore, should be implemented if at all possible.


MISB MOTION IMAGERY STANDARDS BOARD

MISB TRM 0909

Technical Reference Material

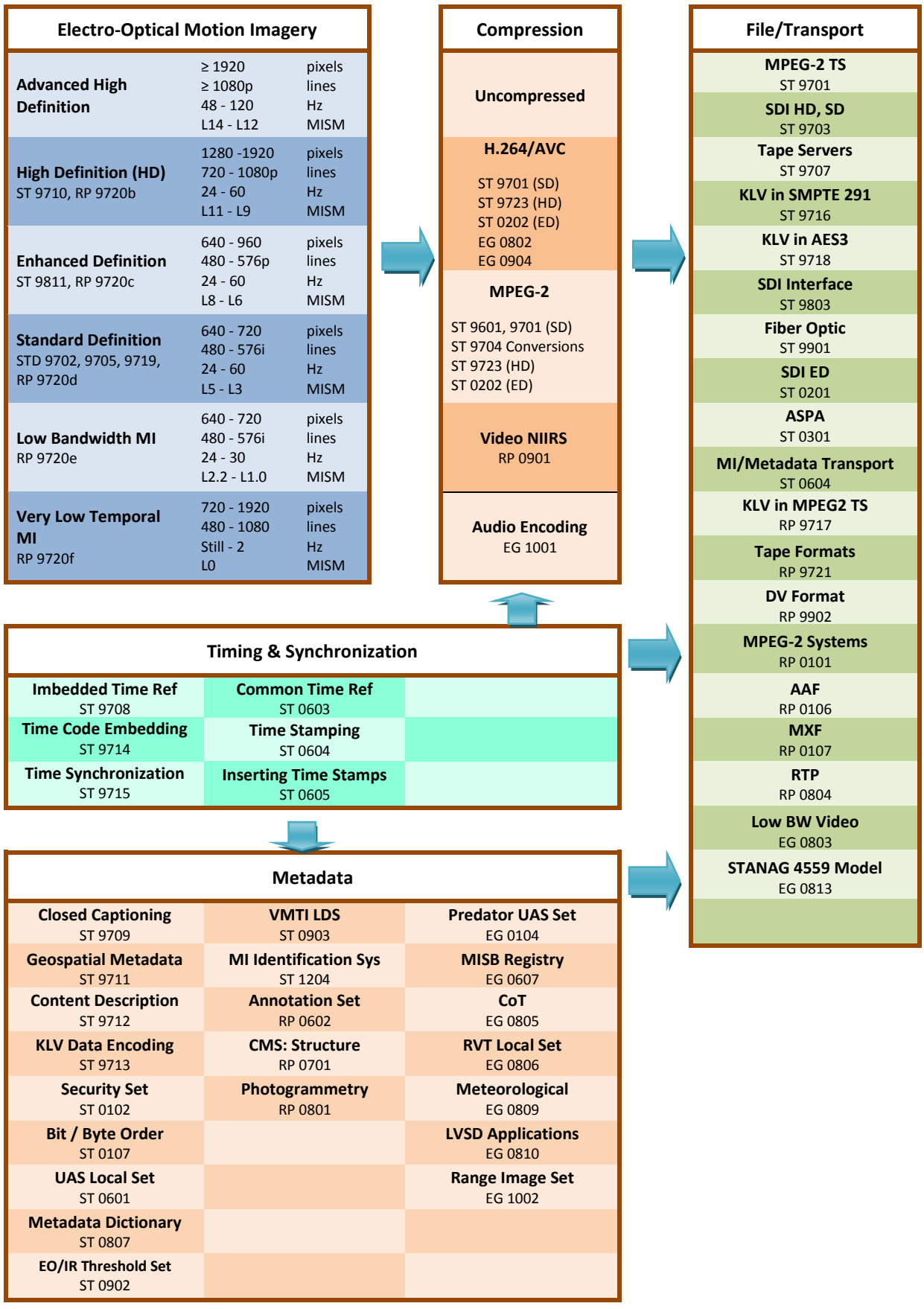
11 January 2010

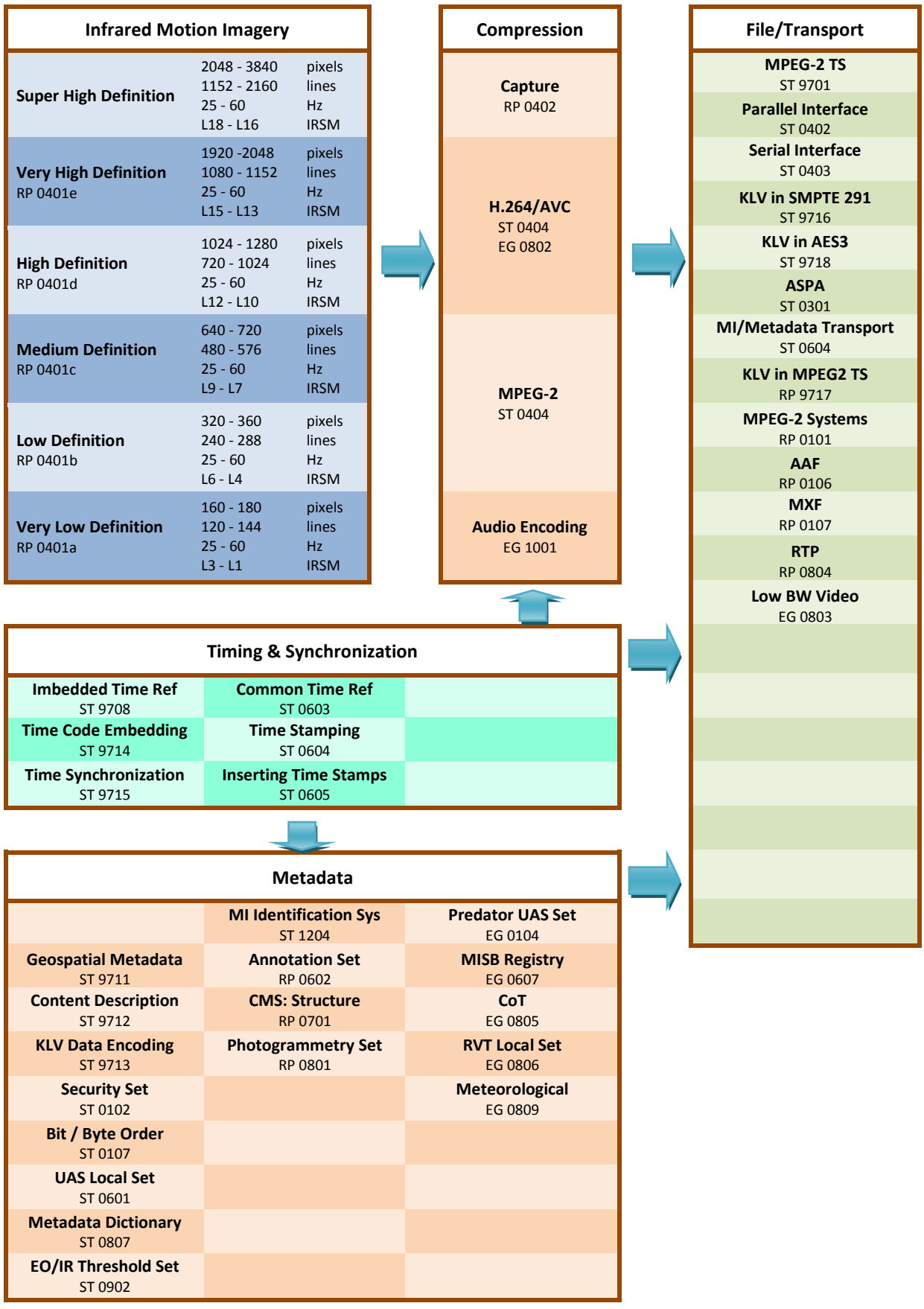
Constructing a MISP Compliant File

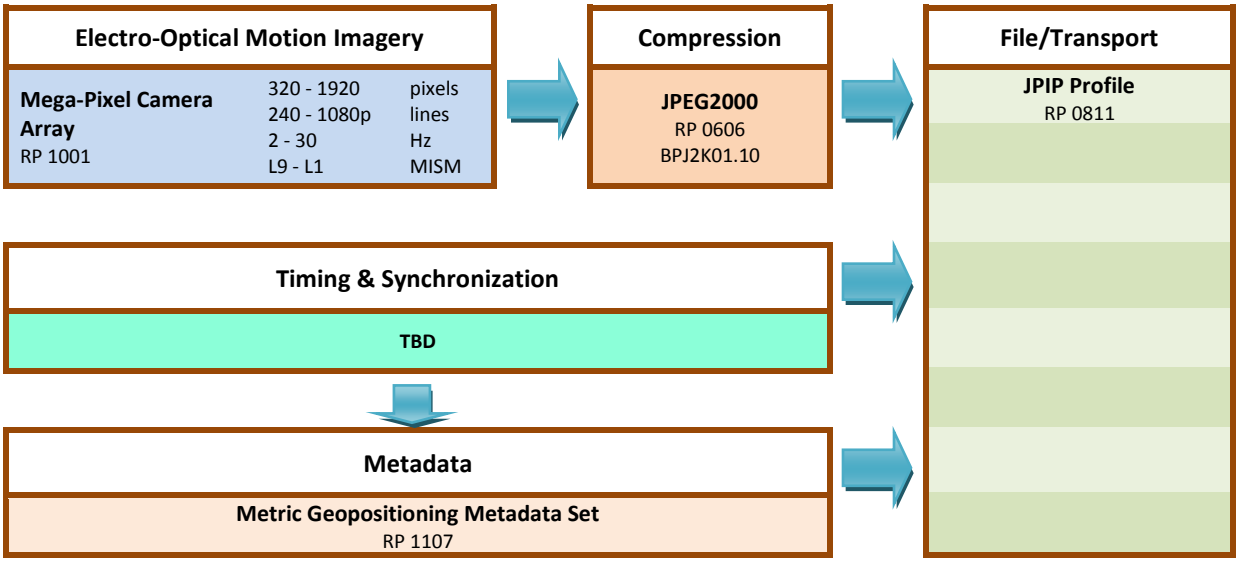
1 Scope

This document provides guidance on how to construct an example MISP (Motion Imagery Standards Profile) compliant file/stream using technologies approved by the Motion Imagery Standards Board. *It is intended as informative only and is not exhaustive in covering all*

TECHNICAL REFERENCE MATERIAL: Documents information collected from research, technical exchange meetings, or study that does not result in a Standard, Recommended Practice, or Engineering Guideline, but contributes to further understanding of the topic that may prove useful in the application of said MISB documentation.


Electro-Optical Motion Imagery
Advanced High Definition
≥ 1920 pixels
≥ 1080p lines
48 - 120 Hz
L14 - L12 MISM
High Definition (HD)
ST 9710, RP 9720b
1280 -1920 pixels
720 - 1080p lines
24 - 60 Hz
L11 - L9 MISM
Enhanced Definition
ST 9811, RP 9720c
640 - 960 pixels
480 - 576p lines
24 - 60 Hz
L8 - L6 MISM
Standard Definition
STD 9702, 9705, 9719, RP 9720d
640 - 720 pixels
480 - 576i lines
24 - 60 Hz
L5 - L3 MISM
Low Bandwidth MI
RP 9720e
640 - 720 pixels
480 - 576i lines
24 - 30 Hz
L2.2 - L1.0 MISM
Very Low Temporal MI
RP 9720f
720 - 1920 pixels
480 - 1080 lines
Still - 2 Hz
L0 MISM
Compression
Uncompressed
H.264/AVC
ST 9701 (SD)
ST 9723 (HD)
ST 0202 (ED)
EG 0802
EG 0904
MPEG-2
ST 9601, 9701 (SD)
ST 9704 Conversions
ST 9723 (HD)
ST 0202 (ED)
Video NIIRS
RP 0901
Audio Encoding
EG 1001
File/Transport
MPEG-2 TS
ST 9701
SDI HD, SD
ST 9703
Tape Servers
ST 9707
KLV in SMPTE 291
ST 9716
KLV in AES3
ST 9718
SDI Interface
ST 9803
Fiber Optic
ST 9901
SDI ED
ST 0201
ASPA
ST 0301
MI/Metadata Transport
ST 0604
KLV in MPEG2 TS
RP 9717
Tape Formats
RP 9721
DV Format
RP 9902
MPEG-2 Systems
RP 0101
AAF
RP 0106
MXF
RP 0107
RTP
RP 0804
Low BW Video
EG 0803
STANAG 4559 Model
EG 0813
Timing & Synchronization
Imbedded Time Ref
ST 9708
Common Time Ref
ST 0603
Time Code Embedding
ST 9714
Time Stamping
ST 0604
Time Synchronization
ST 9715
Inserting Time Stamps
ST 0605
Metadata
Closed Captioning
ST 9709
VMTI LDS
ST 0903
Predator UAS Set
EG 0104
Geospatial Metadata
ST 9711
MI Identification Sys
ST 1204
MISB Registry
EG 0607
Content Description
ST 9712
Annotation Set
RP 0602
CoT
EG 0805
KLV Data Encoding
ST 9713
CMS: Structure
RP 0701
RVT Local Set
EG 0806
Security Set
ST 0102
Photogrammetry
RP 0801
Meteorological
EG 0809
Bit / Byte Order
ST 0107
LVSD Applications
EG 0810
UAS Local Set
ST 0601
Range Image Set
EG 1002
Metadata Dictionary
ST 0807
EO/IR Threshold Set
ST 0902


Infrared Motion Imagery
Super High Definition
2048 - 3840 pixels
1152 - 2160 lines
25 - 60 Hz
L18 - L16 IRSM
Very High Definition
RP 0401e
1920 -2048 pixels
1080 - 1152 lines
25 - 60 Hz
L15 - L13 IRSM
High Definition
RP 0401d
1024 - 1280 pixels
720 - 1024 lines
25 - 60 Hz
L12 - L10 IRSM
Medium Definition
RP 0401c
640 - 720 pixels
480 - 576 lines
25 - 60 Hz
L9 - L7 IRSM
Low Definition
RP 0401b
320 - 360 pixels
240 - 288 lines
25 - 60 Hz
L6 - L4 IRSM
Very Low Definition
RP 0401a
160 - 180 pixels
120 - 144 lines
25 - 60 Hz
L3 - L1 IRSM
Compression
Capture
RP 0402
H.264/AVC
ST 0404
EG 0802
MPEG-2
ST 0404
Audio Encoding
EG 1001
File/Transport
MPEG-2 TS
ST 9701
Parallel Interface
ST 0402
Serial Interface
ST 0403
KLV in SMPTE 291
ST 9716
KLV in AES3
ST 9718
ASPA
ST 0301
MI/Metadata Transport
ST 0604
KLV in MPEG2 TS
RP 9717
MPEG-2 Systems
RP 0101
AAF
RP 0106
MXF
RP 0107
RTP
RP 0804
Low BW Video
EG 0803
Timing & Synchronization
Imbedded Time Ref
ST 9708
Common Time Ref
ST 0603
Time Code Embedding
ST 9714
Time Stamping
ST 0604
Time Synchronization
ST 9715
Inserting Time Stamps
ST 0605
Metadata
MI Identification Sys
ST 1204
Predator UAS Set
EG 0104
Geospatial Metadata
ST 9711
Annotation Set
RP 0602
MISB Registry
EG 0607
Content Description
ST 9712
CMS: Structure
RP 0701
CoT
EG 0805
KLV Data Encoding
ST 9713
Photogrammetry Set
RP 0801
RVT Local Set
EG 0806
Security Set
ST 0102
Meteorological
EG 0809
Bit / Byte Order
ST 0107
UAS Local Set
ST 0601
Metadata Dictionary
ST 0807
EO/IR Threshold Set
ST 0902


Electro-Optical Motion Imagery
Mega-Pixel Camera Array
RP 1001
320 - 1920 pixels
240 - 1080p lines
2 - 30 Hz
L9 - L1 MISM
Compression
JPEG2000
RP 0606
BPJ2K01.10
File/Transport
JPIP Profile
RP 0811
Timing & Synchronization
TBD
Metadata
Metric Geopositioning Metadata Set
RP 1107

Motion Imagery

Motion Imagery is defined as imagery [a likeness or representation of any natural or man-made feature or related object or activity] utilizing sequential or continuous streams of images that enable observation of the dynamic, (temporal), behavior of objects within the scene. Motion Imagery temporal rates—nominally expressed in frames per second—must be sufficient to characterize the desired dynamic phenomena. Motion Imagery is defined as including metadata and nominally beginning at frame rates of 1 Hz (1 frame per second) or higher within a common field of regard. Full Motion Video (FMV) falls within the context of these standards. Within motion imagery, the following domains are currently specified:

- Electro Optical (including video and television)
- Infrared (including low-light television)
- LVSD – Large Volume Streaming Data
- Multispectral (MSI) / Hyperspectral (HSI)

Motion Imagery Standards Profile Applicability to DoD/IC/NSG Communities

The MISP is applicable to all DoD/IC/NSG motion imagery systems that are subject to the DoD Joint Technical Architecture and the NSG Technical Architecture. All new motion imagery systems are required to be compliant with provisions of the MISP as soon as practical. All analog motion imagery systems are considered to be legacy systems as of 12 June 1997. In accordance with the MISP, all new systems are required to be based on digital motion imagery technology.

MISP Compliance

Motion Imagery Standards Profile (MISP) compliance is based upon compliance to a specified approved version of the MISP. The motion imagery system supplier specifies the MISP version for which it is seeking compliance (only MISP 4.4 and newer versions are testable by the JITC- Joint Interoperability Test Command) along with three qualifications: the MISM-Level for video compression, the file format for transport or storage, and the metadata RP/EG/STDs used. MISM levels are as defined per the MISP version specified by the system supplier. All signals tested are assumed digital. Metadata is tested for compliance to the specified version of the MISP and respective EG's/RP's. Draft RPs/EGs will not be tested until approved by the MISB. The motion imagery system may include other MISB RPs/EGs of their choice including, for example, RP 0608, RP 0602 and/or RP 0103, although these are not required for compliance. In addition, Security metadata shall comply with MISB Standard 0102.